

# Entrapment of a Swan–Ganz Catheter

Lung-Ching Chen<sup>1,2</sup>, Po-Hsun Huang<sup>2,3\*</sup>

<sup>1</sup>Intensive Care Unit, <sup>3</sup>Division of Cardiology, Department of Internal Medicine, Taipei Veterans General Hospital, and <sup>2</sup>National Yang-Ming University School of Medicine, Taipei, Taiwan, R.O.C.

Failure to withdraw a catheter is related primarily to catheter entrapment or knotting. Placement of a Swan–Ganz catheter is associated with various complications, one of which is entrapment. Entrapment of a Swan–Ganz catheter in the heart, vena cava, or pulmonary artery is a very rare and serious complication that may lead to life-threatening complications if not treated appropriately. Most reported cases of catheter entrapment have been associated with surgical sutures, artificial valves, or abnormal cardiac anatomy. Here we report a rare case of Swan–Ganz catheter entrapment resulting from inserting an excessive length of Swan–Ganz catheter into the heart. The catheter was removed smoothly under fluoroscopic guidance. [*J Chin Med Assoc* 2007;70(5):213–214]

**Key Words:** entrapment, Swan–Ganz catheter

## Introduction

Placement of a pulmonary artery catheter (Swan–Ganz catheter) for hemodynamic monitoring in intensive care units is associated with various complications, one of which is entrapment of the catheter. Entrapment of a Swan–Ganz catheter in the heart, vena cava, or pulmonary artery is a very rare and serious complication that may lead to potentially life-threatening complications such as cardiac rupture, pulmonary artery rupture, or cardiac tamponade. Although Swan–Ganz catheter entrapment is a rare complication, it should be considered when difficulty is encountered in retrieving the catheter. Most reported cases of catheter entrapment have been associated with surgical sutures, artificial valves, or abnormal cardiac anatomy. Here we report a rare case of Swan–Ganz catheter entrapment. In this case, early diagnosis of entrapment of catheter was made by chest roentgenogram and careful removal of the catheter was performed smoothly under fluoroscopy.

## Case Report

A 79-year-old man was transferred to our coronary care unit due to worsening of heart failure symptoms, and a Swan–Ganz catheter was inserted for hemodynamic

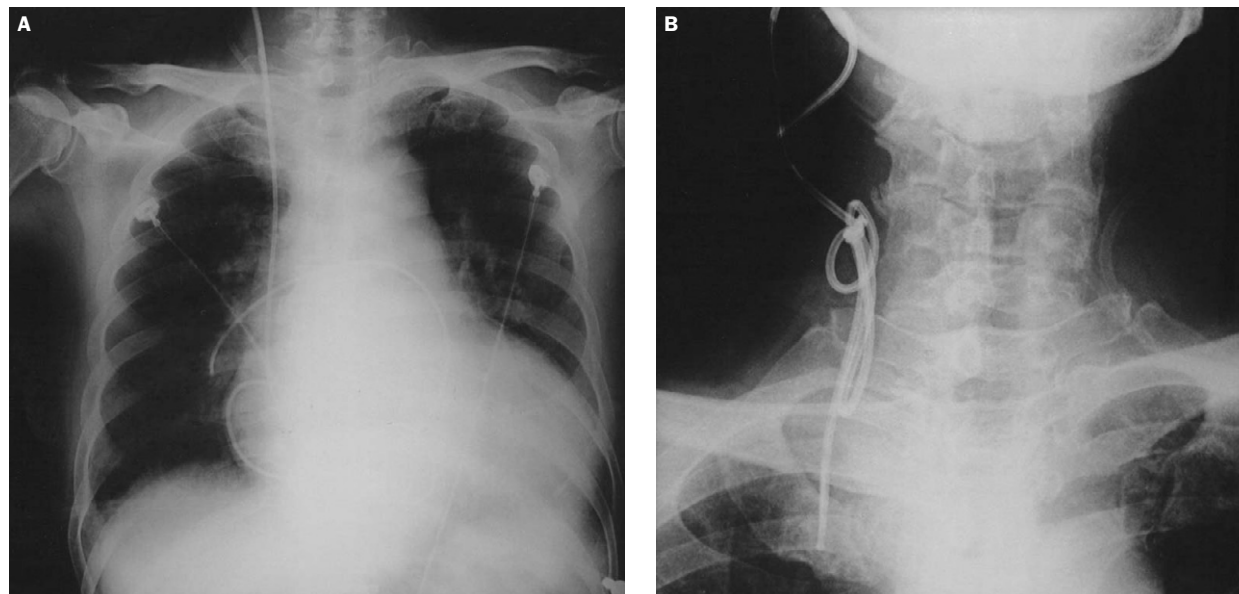
monitoring. The pulmonary wedge pressure waveform was not obtained until the Swan–Ganz catheter had been inserted to 90 cm. The follow-up chest roentgenogram is shown in Figure 1A. The patient's symptoms improved after 3 days' intensive treatment.

Unfortunately, great resistance was felt when we tried to withdraw the Swan–Ganz catheter, therefore another chest roentgenogram was taken. A knot formed by the twisted Swan–Ganz catheter at the distal tip of the sheath was discovered (Figure 1B). Finally, we decided to consult cardiovascular surgeons and they performed a small skin cut-down and removed the catheter successfully under fluoroscopy. The wound recovered well and the patient was transferred to the general ward thereafter.

## Discussion

Using a pulmonary artery catheter or Swan–Ganz catheter for measurement of pulmonary artery pressure, pulmonary capillary wedge pressure, mixed venous oxygen saturation, and cardiac output during cardiac surgery or for hemodynamic monitoring is a common clinical practice. Entrapment of a Swan–Ganz catheter in the heart, vena cava, or pulmonary artery is an uncommon and serious complication that may lead to potentially life-threatening complications such as

\*Correspondence to: Dr Po-Hsun Huang, Division of Cardiology, Taipei Veterans General Hospital, 201, Section 2, Shih-Pai Road, Taipei 112, Taiwan, R.O.C.  
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**Figure 1.** Chest roentgenogram after insertion of a Swan-Ganz catheter. (A) The catheter shows a twisted course within the dilated right ventricle. (B) Knotting of the Swan-Ganz catheter at the distal tip of the sheath.

sudden cardiac rupture, pulmonary artery rupture, or cardiac tamponade if not recognized early and treated appropriately. Although Swan-Ganz catheter entrapment is uncommon, it should be highly suspected when difficulty is encountered in retrieving the catheter. Pulmonary artery catheter entrapment has been reported at the inferior vena cava cannulation site, and at infrarenal inferior vena cava filter placed for deep vein thrombosis.<sup>1,2</sup> Attempts to extricate the pulmonary artery catheter forcibly are extremely dangerous and can result in life-threatening bleeding.<sup>3</sup>

If knotting occurs, passing a guide wire through the Swan-Ganz catheter may untangle the knot by straightening the catheter.<sup>4</sup> Percutaneous extrication of the catheter was suggested under fluoroscopy in the cardiac catheterization laboratory. Fluoroscopy was able to rule out catheter knotting and follow up the procedure. Previous reports also suggested transesophageal echocardiography to be a useful noninvasive tool to diagnose pulmonary artery catheter entrapment and clarify the location.<sup>5</sup> Block reported a technique for nonsurgical removal of the pulmonary artery catheter entrapped in a right atrial suture.<sup>6</sup> He used a Teflon sleeve inserted percutaneously to stabilize the right atrium while gentle traction was used to break the catheter at its point of entrapment. Then, he was able to pull out the proximal portion of the catheter. The distal segment of the catheter was removed with a biopsy forceps inserted percutaneously through the femoral vein.

In this case, we made the diagnosis of catheter knotting immediately by chest roentgenogram upon failure

to withdraw the catheter. We consulted cardiovascular surgeons, and they performed a small skin cut down on the patient and removed the catheter successfully under fluoroscopy. We followed up the original chest roentgenogram (Figure 1A) and found that overinsertion of the Swan-Ganz catheter may have been the cause of knotting in this case. Therefore, it is important to avoid inserting an excessive length of Swan-Ganz catheter into the heart to avoid knotting and catheter entrapment as found in this case. Additionally, attempts to extricate the Swan-Ganz catheter forcibly when resistance is felt is extremely dangerous. A chest roentgenogram or fluoroscopy should be taken before any movement is attempted.

## References

1. Huang L, Elsharydah A, Nawabi A, Cork RC. Entrapment of pulmonary artery catheter in a suture at the inferior vena cava cannulation site. *J Clin Anesth* 2004;16:557-9.
2. Freeza EE, Kagan SA. Entrapment of a Swan-Ganz catheter in an IVC filter requiring caval exploration. *J Cardiovasc Surg* 1999;40:905-8.
3. Huang GS, Wang HJ, Chen CH, Ho ST, Wong CS. Pulmonary artery rupture after attempted removal of a pulmonary artery catheter. *Anesth Analg* 2002;95:299-301.
4. Ewer MS, Ali MK, Gibbs HR, Swafford J. Nodus migrans, the case of migrating knot. *Am J Crit Care* 1992;1:108-10.
5. Troianos CA, Stypula RW. Transesophageal echocardiographic diagnosis of pulmonary artery entrapment and coiling. *Anesthesiology* 1993;79:602-4.
6. Block PC. Snaring of a Swan-Ganz catheter. *J Thorac Cardiovasc Surg* 1976;71:917-9.